

In the Claims

Please cancel Claim 1.

Please amend Claims 2, 4-10, and 12.

2. (Amended) An apparatus for microwave radio frequency communication wherein an upstream radio frequency (RF) band is used for transmitting signals in an upstream direction, and a downstream radio frequency band is used for receiving signals in a downstream direction, the apparatus comprising:

an up-converter comprising at least two up-converter stages, each up-converter stage including a mixer, and each mixer accepting a respective local oscillator signal wherein a final up-converter stage is connected to provide a transmit RF upstream signal;

a1 a down-converter, comprising at least two down-converter stages, each down-converter stage including a mixer and accepting a respective local oscillator signal wherein a first down-converter stage is connected to receive a receive RF downstream signal;

the mixers in the first down-converter stage and the final up-converter stage being connected to receive a common local oscillator signal;

a local reference oscillator, for providing a local reference signal;

a first frequency multiplier circuit, connected to receive the local reference signal, and to provide the common local oscillator signal at a frequency which is an integer multiple of the local reference signal;

wherein the local reference signal is also to derive the local oscillator signal coupled to one of the mixers in a down-converter stage which is not the first down-converter stage, or the local reference signal is used to derive the local oscillator signal coupled to one of the mixers in an up-converter stage which is not the final up-converter stage; and

wherein the local reference signal is fed to a second frequency-multiplier circuit to provide the local oscillator signal coupled to the mixer in the final down-converter stage.

34. (Amended) An apparatus as in claim ¹/₂ wherein the down-converter stages shift a carrier frequency of the microwave RF downstream signal by a factor of 10 times the local reference.

a2 4. (Amended) An apparatus as in claim ¹/₂ wherein the up-converter shifts a carrier frequency of the microwave RF upstream signal by a factor of 10 times the local reference.

5. (Amended) An apparatus as in claim ¹/₂ wherein the first frequency multiplier circuit includes a series pair of frequency doubler circuits.

6. (Amended) An apparatus as in claim ¹/₂ additionally comprising:
a second reference local oscillator, coupled to provide the local oscillator signal to one of the mixers in an up-converter stage which is not the final up-converter stage, or coupled to provide the local oscillator signal to the mixer in a down-converter stage which is not the first down-converter stage, the frequency of the second local reference oscillator being selected to separate the upstream and modem downstream signals by a desired guard band.

7. (Amended) An apparatus as in claim ¹/₂ wherein an upstream RF band and a downstream RF band are contiguous in frequency.

8. (Amended) An apparatus as in claim ¹/₂ wherein an upstream RF band and a downstream RF band are separated in frequency.

9. (Amended) An apparatus as in claim ¹/₂ wherein the transmit RF upstream signal and the receive RF downstream signal are coupled to an antenna.